LEARNING

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LEARNING OBJECTIVE

• 1. Learning about Learning
• 2. Learn the rules of learning
SEVEN CORE SKILLS FOR THE NEW WORLD

- Literacy
- Numeracy
- Problem Solving
- Interpersonal Team Work
- Communication
- Self Management
- Life Long Learning
LITERACY

• “understanding, evaluating, using and engaging with written texts to participate in society, to achieve one’s goals, and to develop one’s knowledge and potential” (OECD, 2012b).

• “literacy” is a broader construct than “reading,” narrowly understood as a set of strategies for decoding written text.
HOW DOES LANGUAGE DEVELOP

• Phonetic
• Is it different for mandarin?
• Importance of visual learning
• Dyslexia different for English versus mandarin?
NUMERACY

• “the ability to access, use, interpret and communicate mathematical information and ideas, in order to engage in and manage the mathematical demands of a range of situations in adult life” (OECD, 2012b).

• “numerate behavior,” which involves managing a situation or solving a problem in a real context by responding to mathematical information and content represented in multiple ways.
SCIENCE OF COUNTING NUMBERS

• Intraparietal sulcus
• Animals to humans
• Dyscalculia
• Can you retrain?
PROBLEM SOLVING

• problem solving in technology-rich environments is defined as “using digital technology, communication tools and networks to acquire and evaluate information, communicate with others and perform practical tasks.”
INSIGHT

• Insight versus deliberate
• strong activation in a brain area called the anterior cingulate cortex. Widen or narrow their attention — say, when they filter out distractions to concentrate on a difficult task, like listening for a voice in a noisy room. Insight puzzle-solving, the brain seems to widen its attention, in effect making itself more open to distraction, to weaker connections..
TEAM WORK

• the capacity to relate to others and work cooperatively.

• Core skill in the labor market
COMMUNICATION

- Effective communication is much more than being able to talk; it is also the ability to listen and understand others, to “read” and interpret body language and to know the best ways to get points across.
SELF MANAGEMENT

TIME MANAGEMENT

DECISION MAKING

SELF ASSESSMENT

TASK MANAGEMENT

GOAL SETTING
LIFELONG LEARNING

• Heutagogy on *learning how to learn*,
• HABIT INQUISITIVE CREATIVE SELF DIRECTED LEARNING
• KEY FOR WORK PLACE GROWTH
Twenty terrible reasons for lecturing
Retention: 1st 10 mins: 70% : last 10 mins: 20%
(McKeachie, 1986)

Paying attention: 40%
(Pollo 1984)
15,000-17,000 medical journals!!!
Forgetting – What we have known since the 1860’s

The time course of forgetting

Source: Hermann Ebbinghaus, Memory: A Contribution to Experimental
RULES FOR LEARNING
RULE #1

• The first rule of learning:
• Curiosity based exploration drives experience dependent learning. Learn by remaining curious, discover, experience explore the world.
THE SCIENCE

- Rats Nissen cross electrical grid to explore
- Monkeys Harlow play with objects and explore without reward
- Berlyne epistemic curiosity
- Curiosity obeys an inverted U-shaped curve, so that we’re most curious when we know a little about a subject (our curiosity has been piqued) but not too much
The participants were presented with a selected trivia question and while they waited for the answer to pop up on the screen, they were shown a picture of a neutral, unrelated face.

Afterwards, they performed a surprise recognition memory test for the presented faces.

As expected, when people were highly curious to find out the answer to a question, they were better at learning that information.
DOPAMINE REWARD CURIOSITY

• question was first asked, subjects showed a substantial increase in brain activity in three separate areas: the left caudate, the prefrontal cortex and the parahippocampal gyri.

• Caudate reward

• Dopamine mechanism

• intrinsic motivation – curiosity – affects memory,”Gruber neuron
RULE #2

- Set the right goals in the right way for the right time period
- Set your own goals that are specific, concrete and measurable
- Set specific goals that is near term not in the distant future
- Start with goals that are realistic and achievable at the beginning
- Stretch goals and make them more difficult as skills develop
RULE #2

• SMART GOALS:
• A very popular approach to goal setting is SMART.
• The acronym is
• S=Specific
• M=Measurable
• A=Achievable
• R=Relevant
• T=Time limited.
JUST RIGHT

• Goldilocks rule, not too hard, not too easy but just right".
SCIENCE

• If - then sequence and goal setting prefrontal top down control to bottom up cue based activation
• EEG and FMRI studies Golwitzer
RULE #3: ORGANIZE YOURSELF

• To meet goals and develop a sustainable learning cycle requires self-discipline and organization self-regulation.
• The first is being aware of one’s thoughts and behaviour (Self-observation or self-monitoring)
• Self-judgement is to use the self-monitoring to ask how they are performing, whether they are falling behind, whether the effort that they are using is sufficient etc
ORGANIZE

• Self-reaction is when they adjust their actions based on self-judgement. So for example, if the goal is not realistic then revising their goal.
RULE #4: REPETITION RULES AND PRACTICE MAKES PERFECT
RULE #5: RECALL IS BETTER THAN READING
In contrast to restudy, initial testing that contributed to future memory success was associated with engagement of several regions including the anterior hippocampus, lateral temporal cortices, and medial prefrontal cortex (PFC). Additionally, testing enhanced hippocampal connectivity with ventro-lateral PFC and midline regions. These findings indicate that the testing effect may be contingent on processes that are typically thought to support memory success at encoding. [Cabeza 2013 Neuropsychologia]
Practice more of what you know less well or have trouble with.

If the learning can be simulated use that approach as much as possible.

RULE #6: IT IS NOT JUST SIMPLE REPETITION BUT PLANNED THOUGHTFUL AND DELIBERATE PRACTICE
RULE # 7: SPACE YOUR LEARNING

• If you want to remember for just a short while, cram. If you want to remember for a long time, space the interval between learning sessions.
• Longer intervals are better for long term retention
• fMRI study, participants were scanned while intentionally memorizing 120 novel faces, half under the massed learning condition and the other half under the spaced learning. Successful face memory encoding associated with stronger activation in the bilateral fusiform gyrus, which showed a significant repetition suppression effect modulated by subsequent memory status and spaced learning. Spaced learning significantly reduced repetition suppression.

Gui Xue, Leilei Mei and Qi Dong 2011
RULE #9: INTERLEAVING

• Switch topics when learning
• Switch problems when learning
• Switch all the time
RULE#10: TEST YOURSELF

• Testing yourself keeps you engaged that in turn means more repetition. But the best test are those that make you use the information and extend yourself. Think about where else what you learnt could apply.
RULE #12: LEARNING WITH CONCEPTS
RULE #14: LEARN WITH FRIENDS: PEER LEARNING
New Instructional Strategy:

TeamLEAD
(Learn, Engage, Apply, Develop)
Voice Annotated Presentations

• Editable, “Update-able”
• Different Versions possible
• Review of lectures for Quality
  – Open Community (Wikipedia)
• User:
  – ability to search for specific topic
  – “Just in time” education
Scenario #2
Random access to slides of interest

- Guillain-Barré syndrome, acute
- Chronic inflammatory demyelinating polyradiculoneuropathy (CIDP)
- Leprosy
- Diphtheria
- Varicella-Zoster (Shingles)
Algebra

Conceptual videos and worked examples from basic algebra through algebra 2. Includes videos from the former algebra worked examples playlists.

Community Questions
REALITY:

Wishful Thinking:

Before

During

Active Learning

After

Exam

Pre-work

Exam

Passive Lecture

Study

Homework

Before

During

After
TeamLEAD: Traditional Reality

Before | During | After
---|---|---
Pre-work | Lecture | Study

Exam

DUKE NUS
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TeamLEAD:

Before

Lecture

During

Exam

After

Study

Video-taped

Pre-work
TeamLEAD:

Before

Video-taped Lecture

During

Team Problem Solving

After

Study

Exam
TeamLEAD:

Before

Video-taped Lecture

During

Team Problem Solving

After

Review

Exam

DUKE NUS GRADUATE MEDICAL SCHOOL SINGAPORE
New Instructional Strategy: TeamLEAD
(Learn, Engage, Apply, Develop)
Individual Readiness Assessment
Group Readiness Assessment
IF/AT forms
Application Phase
Bringing Attention Back Into Your Life

- Attention Driven Game
- A*STAR Technology
- BCI Signal Processing Software

CEREBRO – Interface Headgear

Computer

CE Signal Management System (Wired OR Wireless)

DUKE NUS
GRADUATE MEDICAL SCHOOL SINGAPORE
Pilot Study: Protocol

Baseline Assessment

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<th>PARENT</th>
<th>TEACHER</th>
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<td>CBCL</td>
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<td>ADHD Rating Scale</td>
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<td>CDISC</td>
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Intervention Group

Control Group

3-Months Follow-up

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BCI-based intervention
Pilot Study Results

- Mean change in ADHD Rating Scale IV (ARS-IV) Inattentive (IA) raw scores Week 0-10 as rated by parents
Follow-on Randomization Clinical Trial

• Similar design to the Pilot Study
• Randomization Clinical Trial (RCT) of 140 unmedicated ADHD boys and girls aged 7-12: intervention vs control
• Primary outcome: ADHD Rating Scale Inattentive Score
• Differences now:
  – Randomization (stratified)
  – Behavior management protocol
  – IQ, neuro-cognitive assessment
  – Longitudinal follow-up
BCI elderly memory

The graph shows the median scores over 16 weeks for two groups: 1 - BCI Intervention and 2 - Wait-list control.
The Future: Learning Organization
Bite-sized, 10 minute audio visual vignettes / modules delivering variety of clinical topics
CHANGE AHEAD